KEYNOTE ADDRESS

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Distinguished Guest of honour, Dr. M.S. Swaminathan, President of this function, Dr. S.Z. Qasim, Dr. M. Sakthivel, distinguished invitees, delegates from India and abroad, Ladies and Gentlemen, Dr. Sakthivel deserves our congratulations for his foresight and the herculean effort he has put in to organize this International Conference and Exposition. What we need in India today is public awareness on our marine living resources, its diversity, its importance in our day-to-day life, and how we could manage and husband these resources in a sustainable manner. This Conference and the Expo are helping to create such a climate. Thank you Dr. Sakthivel.

Dr. Swaminathan is a person of great vision and has been the greatest facilitator for the development and growth of fisheries research in this country. He gave fisheries research and development parity with agriculture and animal husbandry, though, today, sad to say, the Government of India has relegated fisheries as an appendix to animal husbandry.

Dr. S.Z.Qasim has been a person of great innovation and daring. His achievements are many and I must say that, but for the tremendous role he played in developing the Antarctic Programme and establishing our first station there, we would not have had a presence in that continent, nor in the affairs of the Southern Indian Ocean and in organizations such as CAMALAR.

The unprecedented developments, which took place in marine fisheries and coastal aquaculture in the seventies and eighties, are things of the past. The decade of the nineties will go down as one beset with major imbalances and frustrating constraints brought about by our own shortcomings, intransigent attitude, surreptitious actions and lack of self regulation leading to calamities not only affecting resources and ecosystems, but also creating societal imbalances. We have yet to recover from these!

We are yet to have legislative approval of a National Fisheries Policy, which has been incubating for long. In effect, we still go by the Indian Fisheries Act of 1896! So also the passage of an Aquaculture Bill in the Parliament. The existing Marine Fishing Regulation Acts and other Instruments in vogue lack adequacy especially in the light of the sea change that is taking place in marine fisheries and coastal aquaculture. Governance of fisheries is in many hands, with several Central and State Ministries involved, but without proper linkages and coordination. Organisational imbalances lead to subjectivity and lop sided decisions. There is a priority for setting it right without which many of the maladies will continue to plague us.

For long, terms such as, **environment** and **conservation** were taboo in fisheries and aquaculture and in a way we are paying the price for this. Responsible stewardship is vital for making the fishery sustainable through proper legislation, regulations, monitoring, control, surveillance and effective enforcement for compliance and strong research support. This could help us avoid conflicts in the use of common resources among stakeholders, avoid environmental degradation and loss of habitats such as the mangrove, coral reef and sea grass ecosystems and consequent

reduction in potential production. Viewed globally, it is estimated that seventy per cent of commercial fisheries have declined, some to the point of no return and a few have collapsed. Conventional management strategies and modeling have failed in a large measure partly due to also poor implementation and non-compliance of management strategies.

It is this scenario that has opened our eyes to an **Ecosystem approach to Fisheries,** which could meet societal concerns about sustainability of fisheries and their environment. Such an approach is equally applicable to fisheries and their environment. Such an approach is equally applicable to aquaculture. In expounding the Ecosystem Approach to Fisheries (EAF) and its implementation Garcia *et al.* (2003) (FAO Fisheries Technical paper N0. 443,71pp.) outline many factors that need to be resolved, some of which have hampered the effectiveness of more conventional fisheries management. The difficulties of EAF implementation may be many. They have highlighted some as "lack of information, lack of scientific assessment, non-matching ecosystem and jurisdiction boundaries, appreciation of role of protected areas, unclear or conflicting objectives, lack of consensus about eco-labeling, insufficient collaboration between institutions in charge of fisheries and environmental management at national and regional levels, lack of integration of fisheries in coastal areas management, need for more transparency and participation, lack of capacity for decentralization, redefinition (and strengthening) of the role of science, relation between trade and the environment (on the role of World Trade Organization) and, last but not least, the potentially large socioeconomic and political costs of transition". This should give us food for thought. In keeping with times, our fisheries policy, which is in the anvil should reflect some of these options of an integrated approach to fisheries management.

Looking at our marine fisheries scenario, I feel a little frustrated. With every successive Five Year Plan Period, in the name of development, we have expanded our fishing fleet irrespective of the carrying capacity of our waters. The result is excess harvesting capacity and some operating with very destructive gears in an unregulated open access system when resources are dwindling. In 1999, I had the privilege to chair a Working Group under the Ministry of Agriculture, Department of Animal Husbandry, for revalidating the potential fishery resources of the Indian EEZ. Our revalidation estimate of 3.93 million tonnes for 2000 is in close agreement with the 1991 estimate of 3.9 m t. This would suggest that there is stagnation and we have reached a plateau. There is more to it. Some of the traditional commercially important species have shown substantial decline from the validation figures of 1991. More important are elasmobranchs (<97,000 t), catfishes (<72,000 t), clupeids (sardines) (<131,000 t), ribbonfishes (<117,000 t) and carangids (<209,000 t). Specifically, some resources have reached asymptotic levels and others are showing a declining trend. The additional major resources which have added up to give the 2,000 revalidation estimate are the subsistence fisheries of bivalves and gastropods of 2.05 lakh m t which were earlier not accounted for and deep-sea fishes of 1.01 lakh tonnes, mostly of low value. It is detrimental to allow such a decline of conventional resources to happen through unregulated fishing. I have heard talks about coastwise seasonal ban on fishing or for specific States, but with no surety about duration, mode of implementation, nor the plight of the fishers and the network linked to them. We do not have the courage to take decisions on essential matters such as the open access system, regulation of effort of fishing craft, ban on use of unauthorized and destructive fishing gears and the use of standardized and approved gears and mesh size, and license fishing for specific resources / fishing grounds. It is imperative that monitoring and

surveillance systems will have to be developed and strictly implemented. Short term ban in fishing should not be arbitrary and are exercises in futility. I will be happy to see the day when administrative and political decisions on developmental issues in fisheries and aquaculture are taken with confidence and scientific advice.

Many of the large predatory pelagic species at the apex of the trophic level such as the tunas, swordfish, sailfish and marlins are considered overfished. A recent estimate is that there has been a decline of over 70 percent in the yellowfin tuna population in the Indian Ocean. Daniel Pauly and Reg Watson (*Scientific American,* July 2003) report that overfishing caused by complexity of food chain has dropped by more than one trophic level in the Arabian Sea and to 0.5 in the Bay of Bengal. The food web will contain fewer trophic levels when overfishing occurs and shortening of the food web will cause disruption to the ecosystem. So also are the extraneous factors such as marine pollution, climate change, *El Nino, La Nina,* and so on, but none as devastating as overfishing. It is time we linked ecosystem data with catch data and reexamine periodically the state of our resources in relation to the ecosystem and trophic levels. This becomes vital for planning any resource restoration efforts.

I am reminded of the eighties when Dr. Swaminathan used to talk about global warming and greenhouse effects and the need for states such as Kerala to develop genetically improved Pokkali varieties of paddy to withstand higher inundation. Sir, environment is taking its toll, but research is lagging.

Again, I would like to draw your attention to a recent publication by R.A. Myres and Boris Worm in *Nature* (Vol. 423, Issue No. 6937, 15 May 2003). They have pointed to the serious concerns raised about the ecological effects of industrialized fishing, which have spurred the United Nations, Johennesburg World Summit on Sustainable Development Resolution (2003) on restoring fisheries and marine ecosystems to the pre-1990 levels by 2015. They have constructed trajectories of community biomass and composition of large predatory fishes in four continental shelf and nine oceanic systems using all available data from the commencement of commercial exploitation. Their findings "Industrialised fisheries reduced community biomass by 80% within 15 years of exploitation". Using a meta-analytic approach they estimate that the large predatory fish biomass is today only 10% of pre industrialized levels. They conclude "declines in large predators in coastal regions have extended throughout the global oceans, with potentially serious consequences for the ecosystems". Their analysis further suggests that "management based on recent data alone may be misleading, and provides minimum estimates for unexploited communities", which could serve as "missing baseline" needed for further restoration efforts".

Their study also covered tropical, subtropical and temperate Indian Ocean. The time trends in community biomass in oceanic ecosystems from the beginning of industrialized fishing for tunas in terms of catch per 100 hooks from the early sixties has steeply declined from 10 to less than 2 in tropical and subtropical Indian Ocean and <1 in temperate Indian Ocean by the year 2000. Thus, the significance and importance of an ecosystem approach to resources conservation and management is profound and the future should lay emphasis on this.

It is time that we took marine capture fisheries from a "sun set" to a "sun rise" industry. Looking at the magnitude of the problem, there is no doubt that we are not investing enough for technology

and infrastructure development. Major inputs are necessary in primary areas such as health hygiene and environmental cleanliness, better fishing harbours, landing and handling facilities for the more efficient functioning of the fisheries sector for maintaining the excellence of the quality of the harvested product to be marketed either in fresh or processed form. Resource enhancement programmes such as the establishment of protected areas in coastal and insular ecosystems, searanching, setting up of artificial reefs, and strict regulation of fishing and reduction of excess fishing effort in traditional grounds need urgent consideration. Suffice it to say that there is need for reoriented thinking, full cooperation and coordination between all the concerned Ministries, State Departments, Industries, R & D Organization and the Stakeholders' involved in a transparent management system.

Coastal aquaculture on the other hand is labeled a "sun rise" sector, though it is trying to extricate itself from many manmade maladies and societal imbalances of the nineties. A strong domestic market is a prerequisite for diversification, but lopsided policies have tended to retard the anticipated growth in this sector. I am particularly impressed by people like Mr. Dasnavis Fernando who have come forward to open very modern outlets for marketing fresh fish locally as well as exposing the customer to a variety of cooked seafood at the outlets. At the other end we have, as you will see at this Expo fisherwomen who will hygienically and in excellent taste demonstrate their culinary skills which model could be widely adopted.

Mariculture has a fantastic future, but has not taken off as it ought to, may be because of shortcomings in economic viability, transfer of technology, and the whole ambit of extension and communication. It is here that I feel that the present Expo is going to throw up to the public and the industry the wide spectrum of economically viable operations that could be undertaken in the open sea, lagoons, bays and estuaries and the wide variety of organisms and seaweeds which could be cultivated profitably. The potential of developing ancillary industries and generating employment potential are immense. We can confidently diversify from shrimp to other crustaceans such as crabs and lobsters, fin fishes, oysters, mussel, clams and cockles, holothurians, ornamental fishes and invertebrates, seaweeds and marine organisms which could yield drugs.

One of the pressing concerns that the industry faces today is the antidumping suit filed by the Ad-hoc Shrimp Trade Action Committee in the USA against import of shrimp from India and five other countries. The Seafood Exporters Association of India under the able leadership of its President Mr. Abraham Tharakan has taken up this matter and let us hope that this will be resolved to our satisfaction.

Another important issue is the import of exotic species and live seed of fish and broodstock and seed of shrimp, which may be carriers of pathogens hitherto not reported from here. On one side we talk about the steps to be taken to protect and foster our diminishing aquatic biodiversity, while on the other, surreptitious introduction of invasive species goes on, be it for aquaculture or as aquarium fish. Memory is short, but we are still to get over the plethora of diseases brought about by the import of diseased shrimp seed from overseas. "The Hindu" of 20th February 2004 reported with photograph of a fresh dead redbellied piranha (*Pygocentrus nattereri*) in the Thames, the natural environment of the species being Amazon. Though piranhas may not

survive the severe winter temperatures serious investigations were underway to trace the source or the aquarium from which it was released. Do we have such concern about the introduction of species including piranhas? The aggressive and voracious *Clarias gariepinus* and *Pangasius suchii* may soon deplete some of the indigenous freshwater fish species in Kerala. Is there any action possible on the perpetrator (s)? In the absence of proper quarantine infrastructure we express concern, but "regularize" such introductions. No doubt, we have presently a system of quarantine in vogue and complying with this requirement is also in the interest of those who are desirous of importing live aquatic organisms from overseas. It is also question of ethics, which needs no elaboration. I only hope that the guidelines formulated for "Aquatic Exotics and Quarantine Guidelines" will come into operation at the earliest. It is time that the Research Institutes re-orient their R & D programmes to meet down to earth requirements through biotechnology, genetic selection of desirable strains of indigenous shrimp species (e.g. *Penaeus indicus* and *Metapenaeus dobsoni*).

I would like to touch on a few other issues, which we may have to confront, some of ethical nature and what will be our stand?

1. The introduction of genetically modified organisms transgenic fish in aquaculture. Are there potential hazards to human health? We are all aware of the concerns and conflicts in the case of GM crops, especially vegetable and fruits. "GM Fish Could Upset Ecological Balance" was the title of a report in "The Hindu" of 26th February, i.e., yesterday, which states that the genetic modifications that improve animals for human consumption also could doom populations if released in the wild. This is when new genes are deliberately introduced into a fish chromosome to make the animal grow larger. But it was found that a population invaded by a few genetically modified individuals would become more and more transgenic, and as it did, the population would get smaller and smaller due to the lower survival rate of young produced by transgenic males.

2. Very often we are assured when exotics are to be introduced that nothing escapes from a culture system, and even if it does, it will be prey to local predators. In June 2003, National Geographic News had an article by James Owen entitled "**Salmon Farm Escapees Threaten Wild Salmon Stock**". It is reported that upwards of two million farm salmon are estimated to have escaped in 2002. In Scotland it is estimated that over one million farm salmon escaped from their sea cages since 1998. One study found that out of 16 rivers in North West Scotland, 14 contained salmon of mixed farm origin. The concern is also expressed that the presence of farmed and hybrid male parr in salmon rivers "ultimately threaten the long-term genetic integrity of native populations". This is the case in a hi-tech farming system!

3. We have serious problems in the use of antibiotics in shrimp farming, so also the use of hormones in feeds. What about the standards and criteria for quality seed production? We have been talking about disease diagnostic laboratories as mobile units to serve the farmers. We have not made progress in this.

4. We have now come to understand that there should be greater harmony between aquaculture and capture fisheries. Strange, is it not? To maintain its growth, the aquaculture industry should see that wild populations of fish are being converted to fish and livestock feed be reduced by adopting alternate management practices. As time passes, we are going to farm more and more carnivorous species, which forage on wild species or the latter form a dominant component in the protein rich feed. This could lead to loss in biodiversity and consequent ecological imbalances. On no account should aquaculture lead to the collapse of the wild stocks. Naylor *et al.* (2000) (Nature Vol. 405, 29 June 2000) have cautioned **"farming can contribute to global (net) fish supplies only if current trends in fish meal and fish oil use for aquaculture are reversed and policies are enforced to protect coastal areas from environmental degradation".** They mention that between 1986 and 1997 "4 of the top 5 and 8 of the top 20 culture species were used in food production for the aquaculture and livestock industries" mostly small pelagic species an example of **fishing down and farming up the food web**. Let us take note of this and look at alternate options as ingredients for fish and shellfish nutrition. There is the need for a shared vision of public and private interests to act jointly to reduce extrinsic costs generated by farming systems.

We can do a lot to restore our capture fishery resources, improve and increase the productivity of our coastal shrimp farms and diversify into mariculture and develop the domestic market with value added products. In this process, let us also give due weight to maintain the quality of the aquatic environment, take a holistic view in our planning where science, conservation management and the role of the stakeholders' with all have a harmonious blend.

I wish Ocean Life, Food and Medicine Expo and the International Conference on Marine Living Resources of India for Food and Medicine all success. Thank You!